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Gold nanoparticle for macrophage targeting of Stavudine

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Globally, there are millions of people living with HIV. Although the current treatment allows controlling the infection, drugs do not efficiently reach target cells such as macrophages which serve as a depot for HIV. It has been proposed, drug delivery systems such as nanoparticles to increase drug intracellular penetration. In this way, stavudine gold nanoparticles have been developed and their uptake by human primary macrophages has been studied. The coupling of stavudine to the nanoparticles was checked by UV-Vis spectroscopy and zeta potential. Human primary monocyte-derived macrophages were incubated for 24 hours with different concentrations of stavudine gold nanoparticles. Nanoparticles concentrations evaluated for the cellular viability ranged from 0.025 to 25 µg Au/mL with only the highest concentration being slightly cytotoxic for the cells. Their uptake by the cells was studied using Transmission Electron Microscopy (TEM), the intracellular concentration of nanoparticles using Inductively Coupled Plasma Mass Spectroscopy (ICP-MS) and the stavudine uptake was quantified indirectly by Ultra-Pressure Chromatography UV spectroscopy (UPLC). The absence of a peak at 530 nm, characteristic of naked gold nanoparticles, in the stavudine-gold nanoparticles spectrum together with the significant change in the ζ -Potential displayed the presence of stavudine coupled to nanoparticles. ICP-MS-based intracellular quantifications of nanocarriers revealed the influence of the nanoparticles concentration in the kinetic of the uptake. UPLC-UV results show that the stavudine uptake after 24 h is deeply higher using gold nanoparticles as carriers. Therefore, stavudine gold nanoparticles, represents a novel nanotechnological strategy to target macrophages, which are of potential interest for HIV therapy.

Biography

Hinojal Zazo Gamez is Licensed in Pharmacy and has done Post-Graduate in design, manufacture and testing of pharmaceuticals by the University of Salamanca, Spain. At present, she is pursuing PhD in Pharmaceutical Technology, in the same university funded by the Spanish government, and has done a research stay in the Department of Medicine III, RWTH Aachen. She is currently working as Assistant in the Department of Pharmacy and Pharmaceutical Technology, University of Salamanca.

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